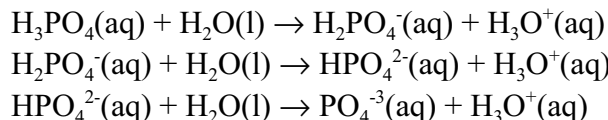


Replacement Test: Multiple Choice Test Questions

1. According to the equations below, what is the conjugate acid of HPO_4^{2-} ?



- A. H_3PO_4 B. H_2PO_4^-
C. PO_4^{3-} D. H_3O^+

2. An increase in the pH of an aqueous solution corresponds to:

- A. an increase in the H^+ concentration and a decrease in the OH^- concentration.
B. a decrease in the H^+ concentration and an increase in the OH^- concentration.
C. an increase in the H^+ concentration with no change in the OH^- concentration.
D. an increase in the OH^- concentration with no change in the H^+ concentration.

3. Which chemical species could behave as both a Bronsted base and as a Bronsted acid?

- A. HSO_4^- B. CO_3^{2-} C. NH_4^+ D. Such a species does not exist.

4. In which one of the following reactions is the species HSO_4^- acting as a Bronsted base?

- A. $\text{HSO}_4^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow \text{H}_2\text{SO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$
B. $\text{HSO}_4^-(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{SO}_4^{2-}(\text{aq}) + \text{H}_2\text{O}(\text{l})$
C. $\text{HSO}_4^-(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{SO}_4^{2-}(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$
D. $\text{HSO}_4^-(\text{aq}) + 2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{HSO}_3^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$

5. Which one of the following is the strongest acid?

- A. Ascorbic acid, $K_a = 8.0 \times 10^{-5}$
B. Benzoic acid, $K_a = 6.5 \times 10^{-5}$
C. 2-hydroxybenzoic acid, $K_a = 1.1 \times 10^{-3}$
D. chloroethanoic acid, $K_a = 1.4 \times 10^{-3}$

6. If a solution has a pH of 7.40, the molar hydroxide ion concentration is:

- A. 6.6 B. 2.5×10^{-7} C. 4.0×10^{-8} D. 1.3×10^{-15}

7. Gaseous hydrogen chloride can be dissolved in water and in methylbenzene. The electrical conductivity of the water solution is much greater than that of the methylbenzene solution. Which of the following statements best accounts for this behaviour?

- A. Pure water is a better conductor than methylbenzene.
B. Water is a better proton acceptor than methylbenzene.
C. Water and methylbenzene are immiscible.
D. Hydrogen chloride has a higher solubility in water than in methylbenzene

8. The acid dissociation constant, K_a (HS^-), is the equilibrium constant for the reaction (in aqueous solution):

- A. $\text{HS}^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{S} + \text{OH}^-$
- B. $\text{HS}^- + \text{H}_3\text{O}^+ \rightleftharpoons \text{H}_2\text{S} + \text{H}_2\text{O}$
- C. $\text{HS}^- + \text{OH}^- \rightleftharpoons \text{S}^{2-} + \text{H}_2\text{O}$
- D. $\text{HS}^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{S}^{2-}$

9. What is the pH of a solution in which $[\text{OH}^-] = 0.020 \text{ M}$?

- A. 12.00
- B. 12.30
- C. 12.60
- D. 13.00

10. Only one of the following substances cannot function as a Lewis acid or a Lewis base. Identify that substance on the basis of its structure.

- A. NH_4^+
- B. NH_2^-
- C. NH_3
- D. BF_3

11. Which substance, when dissolved in water, will undergo hydrolysis to form a basic solution?

- A. NaCH_3COO
- B. NH_4Cl
- C. NaNO_3
- D. BaSO_4

12.. Which one of the following species can function as both an acid and a base, according to the Bronsted-Lowry definition?

- A. HS^-
- B. S^{2-}
- C. NH_4^+
- D. Al^{3+}

13. All of the following reactions are examples of acid-base reactions **except**

- A. $\text{Al}(\text{OH})_3(\text{s}) + 3\text{H}^+(\text{aq}) \rightarrow \text{Al}^{3+}(\text{aq}) + 3\text{H}_2\text{O}(\text{l})$
- B. $\text{Al}(\text{OH})_3(\text{s}) + \text{OH}^-(\text{aq}) \rightarrow \text{Al}(\text{OH})_4^-(\text{aq})$
- C. $2\text{KO}_2(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{KOH}(\text{s}) + \text{H}_2\text{O}_2(\text{l}) + \text{O}_2(\text{g})$
- D. $\text{POCl}_3(\text{l}) + 3\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_3\text{PO}_4(\text{aq}) + 3\text{H}^+(\text{aq}) + 3\text{Cl}^-(\text{aq})$

14. Which one of the following salts would produce the most neutral aqueous solution?

- A. NH_4NO_3
- B. FeCl_3
- C. Na_2SO_4
- D. KCH_3COO